Space Weather Forecast

Issued on Wednesday, 25 January 2023 at 03:52 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Reducing risk of R1/R2 Radio Blackouts. Slight chance of G1/Minor Geomagnetic Storms on Day 2 (26th).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours, with only Common-class X-ray activity observed. The largest flare was a near Moderate-class event from the vicinity of a sunspot region in the far northwest of the visible disc. There are currently nine numbered sunspot regions and one unnumbered sunspot group. By far the largest region is the sunspot group in the far southwest, with moderate complexity, although the leading portion has decayed somewhat in recent hours. The region should reach the western limb at the end of the UTC day on Day 1 (25th).

A couple of small, but moderately sized and fairly complex sunspot groups are present in the northwest. Changes in other spots on the disc were more subtle, with some movement of their constituent spots in several, although for the most part these groups were well-spread in their composition and magnetically simple.

There are currently numerous 'filaments' (arcs of plasma) on the Sun, with most of these concentrated near the western horizon in both hemispheres, which is of note as they could be triggered by the more active sunspots here should they flare appropriately. This appears to occurred with the Common-class flare from the region in the far northwest starting around 24/1400 UTC, which released a moderately-large filament and associated Coronal Mass Ejection (CME), but is not Earth-directed.

Finally a possible CME may have been generated by a minor common class flare at 24/0324UTC near the middle of the Sun, although the nearest ejecta appears to be heading northeast from limited imagery available and is deemed to be 'far-sided' with coincidental timing with the aforementioned flare above. No clear Earth-directed CMEs have been observed, however, some faint ejecta, perhaps associated with occasional flare activity, cannot completely be discounted as having some Earth directed trajectory.

Solar Wind / Geomagnetic Activity: Solar winds have been at slightly elevated to elevated levels 450-500km/s, reducing down to background (around 390km/s) by the end of the UTC day on the 24th. The Interplanetary Magnetic Field strength has been weak throughout, as has the important north-southwards component of the magnetic field. Resultant Geomagnetic activity was Quiet (0-2 Kp).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Low, with a daily chance of becoming Moderate, with the most potent regions in the far west of the visible disc. These should rotate off to become far-sided by the end of the Day 2 (26th), reducing the daily chances of Moderate-class flares, despite new regions likely rotating over the eastern limb in the coming days.

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Solar Wind / Geomagnetic Activity: The geomagnetic forecast is of lower than average confidence for the period. The likelihood of any CMEs affecting Earth during the period is low.

Two high-speed streams from coronal holes are anticipated to arrive at Earth on Day 2 (26th) and Day 3/4 (27/28th). The effects from both are expected to be relatively muted overall.

Geomagnetic activity is forecast to be Quiet through much of, if not all of Day 1 (25th), perhaps increasing to Unsettled late in the UTC day and likely Unsettled to Active by early Day 2, with a slight chance of G1/Minor Storm conditions. Thereafter, activity reducing to mainly Quiet to Unsettled, with a very slight chance of a G1/Minor Storm interval between Days 3 and 4.

Energetic Particles / Solar Radiation: Solar radiation storms continue to carry a daily slight chance of reaching S1 or greater through the period, beginning to abate into the coming UTC weekend.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	20	10	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	50	40	30	30
Very Active	R3 to R5 X	No	5	3	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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